

What is claimed is:

1. A method of frequency division multiple access communications wherein a signal indicative of a plurality of information bits are encoded and modulated into a plurality of coded symbols, and the coded symbols are transformed into a further signal in time-domain, said method comprising:

scrambling the coded symbols in the time-domain for providing a signal stream indicative of scrambled coded symbols; and

inserting the signal stream by redundancy at a guard interval for providing a data stream with guard interval for transmission.

2. The method of claim 1, wherein the data stream is received in a receiver and wherein the received data stream is guard interval removed, converted into frequency-domain and equalized for providing an equalized frequency-domain signal, said method further comprising:

converting the equalized frequency-domain signal into time-domain for providing an equalized time-domain signal;

descrambling the equalized time-domain signal for providing a time domain descrambled signal; and

converting the time-domain descrambled signal into a further descrambled signal in the frequency domain.

3. The method of claim 1, wherein the coded symbols are transformed into the further signal in time domain by an inverse fast Fourier transform (IFFT) operation.

4. The method of claim 2, wherein the received data stream is guard interval removed and then converted into the frequency domain by a fast Fourier transform (FFT) operation.

5. The method of claim 2, wherein the equalized frequency-domain signal is converted into the time domain by an IFFT operation, and the time-domain descrambled signal is converted into the further descrambled signal in the frequency domain by an FFT operation.

6. The method of claim 1, further comprising  
up-converting the data stream with guard interval at a carrier frequency for  
transmission over a frequency selective fading channel.

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7. A transmitter for use in frequency division multiple access communications  
wherein a signal indicative of a plurality of information bits are encoded and modulated  
into a plurality of coded symbols and the coded symbols are transformed into a further  
signal in time-domain, said transmitter comprising:

10 a scrambling module, responsive to the further signal, for providing a signal  
stream indicative of scrambled coded symbols; and

an inserting module, responsive to the signal stream, for inserting the signal  
stream by redundancy at a guard interval for providing a data stream with guard interval  
for transmission.

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8. The transmitter of claim 7, wherein the guard interval has a length which is  
greater than maximum delay spread.

9. A receiver for use in a frequency division multiple access communications  
20 system, the system having a transmitter which comprises:

means for encoding and modulating a signal indicative of a plurality of  
information bits into a plurality coded symbols for providing a further signal in time  
domain indicative of the plurality of coded symbols;

means for scrambling a further signal for providing a scrambled signal;

25 means for inserting the scrambled signal by redundancy at a guard interval for  
providing a guard-interval signal; and

means for transmitting a data stream indicative of the guard-interval signal,  
wherein the data stream received in the receiver is guard-interval removed, converted into  
frequency-domain and equalized for providing an equalized frequency-domain signal,  
30 said receiver comprising:

a first module for converting the equalized frequency domain signal for providing  
an equalized time-domain signal;

a second module for descrambling the equalized time-domain signal for providing a time-domain descrambled signal; and

a third module for converting the time-domain descrambled signal into a further descrambled signal in the frequency domain.

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10. The receiver of claim 9, wherein the data stream received in the receiver is guard-interval removed, converted into the frequency-domain and the equalized for providing an equalized frequency-domain signal by a one-tap channel equalizer.

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11. The receiver of claim 9, wherein the first module comprises an inverse Fourier transform operation for converting the equalized frequency domain signal to the equalized time-domain signal, and the third module comprises a Fourier transform operation for converting the time-domain descrambled signal to the further descrambled signal in the frequency domain.

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12. A frequency division multiple access communications system, comprising:  
a transmitter including:

a first module for encoding and modulating a signal indicative of a plurality of information bits into a plurality coded symbols for providing a further signal indicative of the plurality of coded symbols;

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a second module for converting the coded symbols into frequency-division multiplexed symbols in time-domain;

a third module for scrambling the frequency-division multiplexed symbols in time domain for providing a scrambled signal,

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a fourth module for inserting the scrambled signal by redundancy at a guard interval for providing a guard-interval signal, and

a fifth for transmitting a data stream indicative of the guard-interval signal;

and

a receiver for receiving a data stream, the receiver including:

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a first module for removing the guard-interval in the data stream for providing a guard-interval removed signal;

a second module for converting the guard-interval removed signal into a frequency-domain signal;

a third module for equalizing the frequency-domain signal for providing an equalized frequency-domain signal;

a fourth module for converting the equalized frequency-domain signal into an equalized time-domain signal;

5 a fifth module for descrambling the equalized time-domain signal for providing a time-domain descrambled signal; and

a sixth module for converting the time-domain descrambled signal into a further descramble signal in frequency domain.

10 13. The communications system of claim 12, comprising a wireless local area network (WLAN).

14. The communications system of claim 12, comprising a cellular orthogonal frequency division multiplexing (OFDM) system.

15 15. The communications system of claim 12, comprising a multi-carrier CDMA system.

16. The communications system of claim 12, comprising a digital subscriber line (DSL) system.

17. The communication system of claim 12, comprising a digital broadcasting system.

18. A component in a frequency division multiple access communications system, comprising:

an antenna, and

a transceiver operatively connected to the antenna, the transceiver comprising:

a transmitter including:

30 a first module for encoding and modulating a signal indicative of a plurality of information bits into a plurality coded symbols for providing a further signal indicative of the plurality of coded symbols,

a second module for converting the coded symbols into frequency-division multiplexed symbols in time-domain;

a third module for scrambling the frequency-division multiplexed symbols in time domain for providing a scrambled signal,

a fourth module for inserting the scrambled signal by redundancy at a guard interval for providing a guard-interval signal, and

5 a fifth for transmitting a data stream indicative of the guard-interval signal;

and

a receiver for receiving a data stream via the antenna, the receiver including:

10 a first module for removing the guard-interval in the data stream for providing a guard-interval removed signal;

a second module for converting the guard-interval removed signal into a frequency-domain signal;

15 a third module for equalizing the frequency-domain signal for providing an equalized frequency-domain signal;

a fourth module for converting the equalized frequency-domain signal into an equalized time-domain signal;

a fifth module for descrambling the equalized time-domain signal for providing a time-domain descrambled signal; and

20 a sixth module for converting the time-domain descrambled signal into a further descramble signal in frequency domain.

19. The component of claim 18, comprising a user equipment (UE).

25 20. The component of claim 18, comprising a mobile terminal.